JOHN HOMER WOOLSEY, M. D. (490 Post Street, San Francisco).—The profession is quite well educated to the recognition of symptoms and signs of a perforated peptic ulcer, but now and then delay in order to make an exact diagnosis jeopardizes the patient's chance of recovery. Many of such patients are too sick and suffering too severe pain to give reliable histories. An acute onset of severe pain and the rigid board-like abdomen are sufficient for a diagnosis of, first, an "acute surgical abdomen," and the more refined diagnosis will follow in 75 per cent of instances. A plain roentgen-ray with the patient in a sitting or standing position, as recommended by the authors, is worth while when in doubt. Do not let us delay when there is evidence of the "acute surgical abdomen." When in doubt give the patient the best chance of recovery, and that is direct inspection by laparotomy.

In this paper we are particularly interested in the types and results of treatment. The class of patients who fall to a free city emergency service are usually a malnourished type. Therefore the general resistance will run low and influence the authors' statistics, especially in those instances where operation was delayed to ten hours postrupture. However, I would heartily endorse what they recommend, single closure preferred; but if this is likely to give obstruction to the progress of the meal, then an accompanying gastrojejunostomy. In the acute perforation, characterized by a simple puncture and no accompanying visceral wall induration, simple closure by approximation and inversion as a rule is sufficient. In perforation of an old ulcer, then, the visceral wall induration closure may lead to too much intrusion upon the lumen, and then a gastrojejunostomy is in order. Any pyloroplasty (and the only one of certain enduring benefit is the Finney type) is as a rule contraindicated, for one should avoid fresh incisions in and through an inflamed area.

In the postoperative care I have never found that water in small sips, starting twelve hours postoperatively and in increasing amounts thereafter, has ever interfered with healing or been accompanied by any more likelihood of stasis. On the contrary, I believe this fluid by mouth has been of added comfort to the patient.

The authors' recommendation of nonperitoneal drainage is, in my opinion, wise, but I believe that, as a rule, drainage of the abdominal wound should be employed.

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THOMAS O. BURGER, M. D. (1301 Medico-Dental Building, San Diego).—Ruptured duodenal ulcer is one of the very dramatic surgical conditions where prompt surgery, with very few exceptions, will save more lives than any other comparable intra-abdominal condition. Most of these cases are seen by the general practitioner first, and at the present time the majority of the profession are alert and members of our organization appreciate the urgency of this need of immediate surgery; but, as we know, there are a great many irregulars, nonmembers of medical organizations, religious, or other type that do not recognize or, if they do recognize, do not give these people the benefit that they deserve in the way of immediate attention. It is proved well in this paper, and in other discussions and statistics, that hours of delay means an increasing number of deaths, and the doctor who has the force and ability to persuade these patients or their family to an immediate operation is the benefactor. Fortunately the majority of these people are in such intense agony that they are easily persuaded to go to a hospital, when on other occasions they may be very difficult subjects to persuade. The doctor who repeats his hypodermic of morphin until he produces sufficient ease to allow these patients to go into this second stage or "phase," as it is described in this paper, often loses that golden opportunity of getting the patient at the opportune time.

Ruptures that are quickly protected by surrounding viscera or omentum and held from spreading are not of the outspoken, bold, clinical type that occurs in the vast majority, and their diagnosis is frequently very difficult from other intra-abdominal conditions. Occasionally extra-abdominal conditions as coronary occlusion may suggest very strongly a ruptured duodenal ulcer, but considering their infrequent occurrence and delay incident to diagnosis, this in ninety-odd per cent of the cases is hardly a question when board-like rigidity, shock, and agonizing epigastric pain are present.

Immediate exploration, closing the ulcer, unless there is a very decided induration of the visceral wall, by simply closing the ulcer and vulcanizing a patch of omentum thereon is all that is necessary in probably over 90 per cent of the cases, and intra-abdominal drainage is not usually indicated. Recurrence does occur, as perforation occurred the second time in a patient of mine, but that is a rare case.

Gastro-enterostomy or pyloroplasty has its indications, but in the vast majority of cases I think our reports and statistics show that the extra risk of surgery at this particular time, when all conditions are not so favorable, will be more fatal probably than that later fatality resulting by not doing the operation.

These patients should be followed up carefully, and if symptoms and roentgen-ray findings indicate the recurrence of an ulcer, then more radical surgery can be performed at a more opportune time.

I agree with the authors that spinal anesthesia is extremely desirable in this class of cases. The one disadvantage in rupture of some viscus in the lower abdomen on account of the low head position is not objectionable here because our trouble is in the upper abdomen. Cleansing of the peritoneum is much easier, the operation can be done more rapidly for the repair is easier, and in most instances is more desirable from every standpoint. Patients seen in the very late stages of peritonitis are a serious problem. Often, as has been stated so well in this paper, it is a chemical or a mechanical irritation peritonitis rather than of the septic type. By the institution of the customary treatment for peritonitis, *viz.*, Fowler's position, duodenal drainage, fluid balance, etc., until localization takes place, probably is as great a life-saving treatment as we know.

FRACTURES OF THE FOREARM*

A SIMPLE METHOD OF HANDLING BY MEANS OF WIRE TRACTION

By SAMUEL S. MATHEWS, M. D.
Los Angeles

DISCUSSION *by H. W. Spiers, M.D., Los Angeles; Alfred Edward Gallant, M. D., Los Angeles; Douglas D. Toffelmier, M. D., Oakland.*

THE purpose of this paper is to present a simple and efficient method of handling difficult fractures of the forearm, meeting the two constant requirements in the treatment of any fracture—good reduction and uninterrupted fixation until bony union takes place. By difficult fractures, I mean compound fractures and those cases which cannot be treated successfully by the ordinary, conservative means of handling fractures of the forearm.

METHOD OF PROCEDURE

The procedure is carried out under a general anesthesia in the operating room, and the same precautions are observed as in any major operation. The lower third of the arm and entire forearm, including the fingers, are prepared in

* Read before the Industrial Medicine and Surgery Section of the California Medical Association at the sixty-first annual session, Pasadena, May 2-5, 1932.

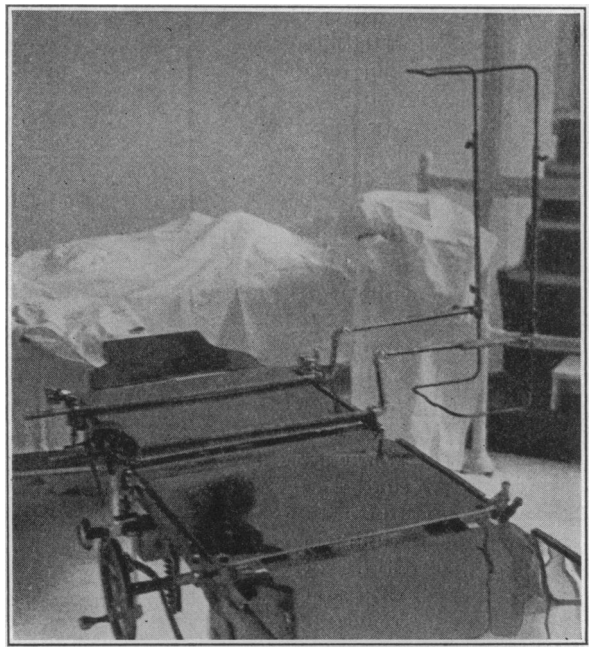

Fig. 1.—Simple frame used for the reduction of forearm fractures. The forearm is suspended between the over- and underhanging cross rods.

the usual manner, with ether, alcohol, and iodin. A small steel wire, 26 gauge piano wire (.01594 inch in diameter), is introduced through both the ulna and radius, without previously incising the skin, one-half inch below the styloid process by means of a specially constructed hand brace. The wire is started on the ulnar side, in view of the fact that the ulnar styloid lies below that of the radius, thus insuring passage of the wire through both bones, and also that it will lie below the ulnar notch of the radius. In a similar manner, wire of the same gauge is inserted through the olecranon. With the wires in place, alcoholic dressings are applied and are held in place by sterile bandage. A U-shaped compressible steel clamp is then applied to both wires for the purpose of keeping them taut. The arm is then brought out to right angle abduction and flexed at the elbow. With the lower clamp tied to a fixed object, overhead traction is then applied.

We have worked out a very convenient frame for the purpose of obtaining this traction. It consists of two pieces of one-fourth inch pipe which are clamped across the table under the patient and extend out on either side of the abducted arm beyond the elbow. Each piece is provided with an upright member. Cross rods, which are bent at right angles, are slipped into both the upper and lower ends of the uprights and are fixed into position by set screws.

The forearm is suspended between the under and overhanging cross rods. By merely raising the upper or lowering the lower cross rods and resetting the set screws, traction can be exerted. By means of a portable x-ray unit or lateral and anteroposterior x-ray pictures, the fragments can be easily manipulated into position. The sterile bandages, holding the alcoholic dressings in place, are cut and a plaster cast is then applied from the mid-forearm down to mid-palm without disturbing the position of the arm. The wire pins are incorporated in the plaster, thus preventing the slipping back of the fragments. As soon as the plaster becomes hard the U-clamps are removed and the protruding pieces of wire are cut off about one-fourth inch from the plaster and the ends covered by a few rolls of plaster bandage. Immobilization is continued until there is sufficient amount of bony callus to prevent a possible displacement of the fragments.

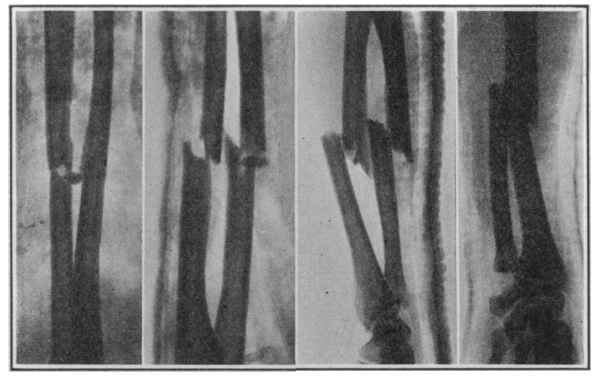

Fig. 4a.—Before reduction. Fig. 4b.—After reduction.

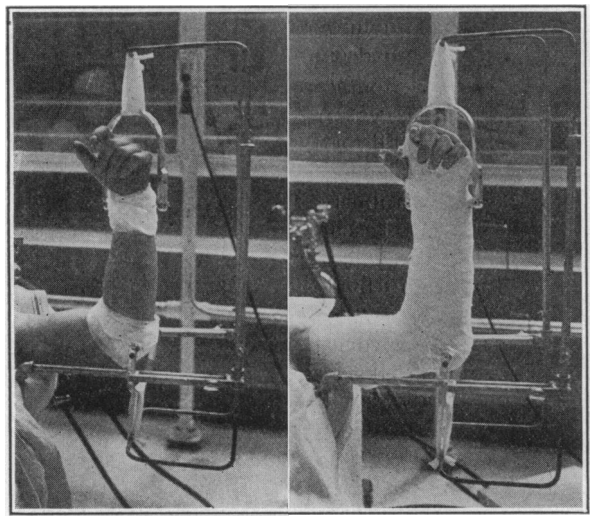

Fig. 2 Fig. 3

Fig. 2.—The forearm fracture, reduced by raising upper cross-bar and resetting set screws, thus exerting pull on upper wire pin.

Fig. 3.—Plaster cast, applied without disturbing position.

When x-rays show that we have enough bony callus to make sure that the fragments will remain in place, the cast is removed. One end of each wire is cut close to the skin edge by means of ordinary wire cutters. The wounds are thoroughly cleaned with alcohol and iodin. The wires are then withdrawn from the opposite side. A new cast is then applied.

DIFFICULTIES IN TREATMENT

Fractures of one or both bones of the forearm above the wrist are affected by all the surrounding

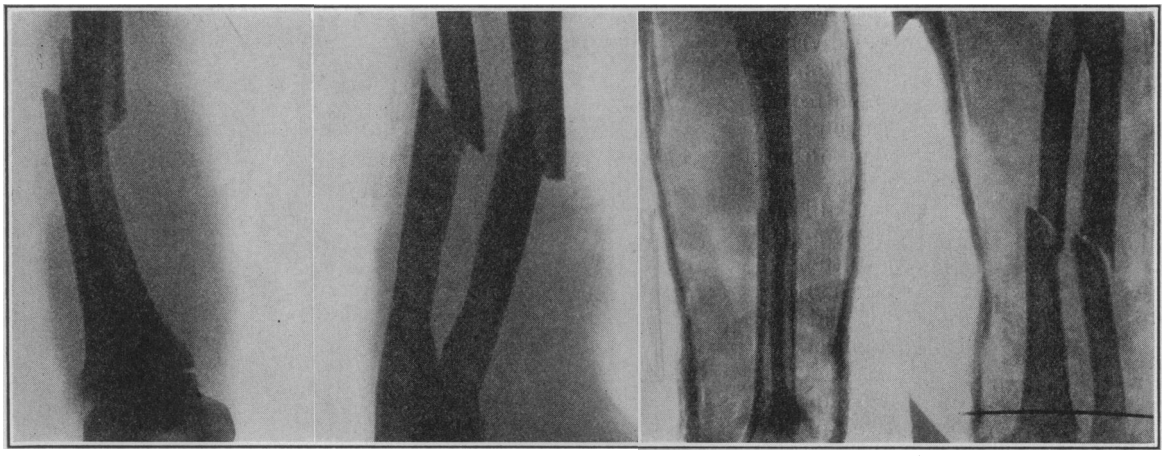

Fig. 5a.—Lateral view before reduction.

Fig. 5b.—Anteroposterior view before reduction.

Fig. 5c.—After reduction.

muscles, as far as longitudinal traction is concerned, but ordinarily it is not the over-riding of the fragments that gives us our difficulty. It is the rotation of the fragments due to the action of the pronators and supinators which makes this type of fracture not only difficult to reduce but also difficult to maintain in reduction by the ordinary means of fixation. We classify such fractures in reference to the insertion of the pronator teres. Fractures below the insertion must occur between the pronator teres and the pronator quadratus, which runs almost transversely across the lower end of both the radius and the ulna. In such fractures, the distal fragments are drawn together, due to the action of the pronator quadratus, assisted by the brachioradialis, which is inserted on the styloid process of the radius and tends to tip the radius toward the ulna. The upper fragments tend to go into position of supination through the action of the biceps, assisted by the supinator brevis, but this is opposed by the pronator teres, which also tends to approximate the upper fragments.

In fractures above the pronator teres, both the pronators are attached to the lower fragment. The pronator quadratus tends to draw the upper end of the lower fragment together, assisted by the brachioradialis. The pronator teres tends to pull the lower fragment into pronation and also pull it toward the ulna. The upper fragment is affected by the biceps and the supinator brevis, whose action is to rotate the upper fragment into supination and flexion, so that the upper fragment is usually anterior to the lower fragment. It is this type of fracture which offers a far more difficult problem, and, as said before, is not only hard to reduce but also hard to hold in reduction by our ordinary methods of handling the forearm.

COMMENTS ON OTHER TREATMENTS

Conservative treatment of these difficult fractures, in this country up to the present time, has varied with the individual operator, and the results have not been particularly encouraging. In most instances, open reduction, with internal fixation, is carried out. In Wilson and Cochran's

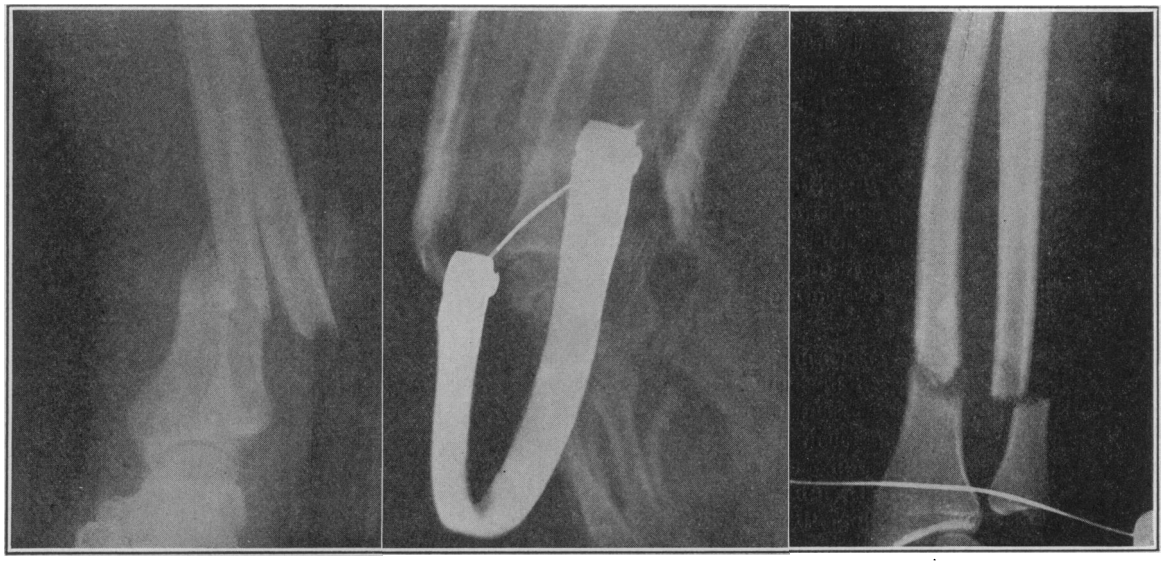

Fig. 6a.—Lateral view before reduction (comp.).

Fig. 6b.—Lateral view after reduction.

Fig. 6c.—Anteroposterior view after reduction.

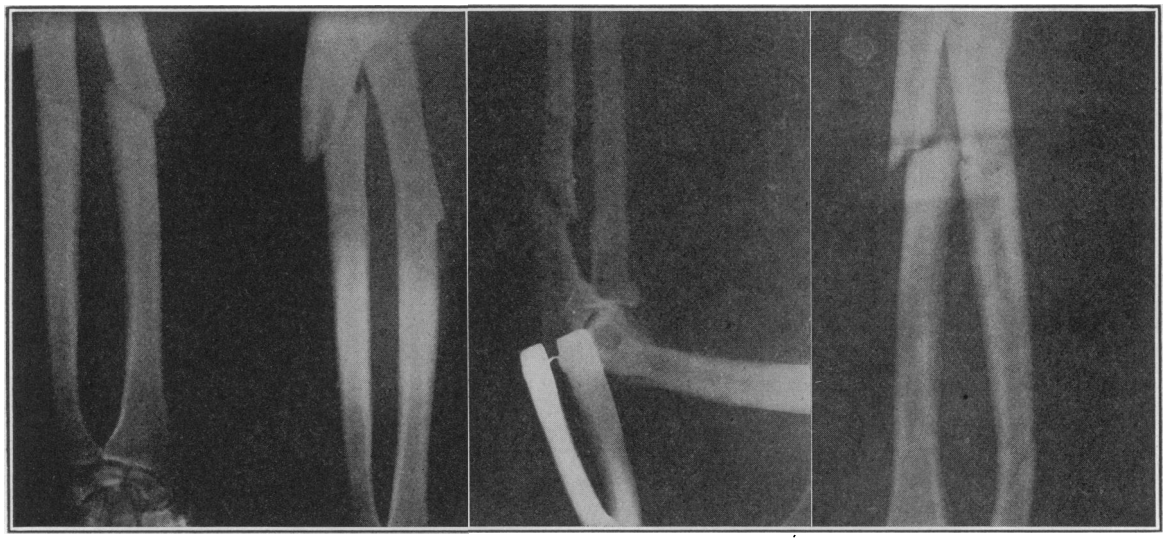

Fig. 7a. — Anteroposterior and lateral view before reduction.

Fig. 7b.—Lateral view after reduction.

Fig. 7c.—Anteroposterior view after reduction.

book on fractures and dislocation, we find under the heading of fractures of both bones of the forearm with displacement, the following:

"Unfortunately, traction methods, although valuable, cannot be depended upon to the same degree for the correction of deformity, as in fractures elsewhere, and skeletal traction in the region of the wrist is scarcely advisable. For these reasons, and because of slight risk to the patient involved by the operation itself, open reduction is more frequently resorted to than in case of many other fractures. Such procedure is justifiable in the hands of a well-equipped surgeon with meticulous technique and large experience in the operative treatment of fractures, but under other auspices is likely, sooner or later, to result in disaster."

These authors no doubt have reference to the large, rigid pin when they advise against skeletal traction in the region of the wrist.

In the bulletin of the American College of Surgeons, on the principle and outline of fracture, one may read:

"If over-riding cannot be overcome and satisfactory reduction obtained, the patient should be referred to a competent surgeon."

Dr. Willis Campbell states in his book on orthopedic surgery that if manual reduction is impossible, an open reduction is indicated. Suspension of the arm from an overhead frame is, at times, of value in securing the reduction of fractures of both bones, in his opinion.

METHOD PREFERRED

In other words, our treatment for such fractures has been open operation if reduction is impossible to attain. We feel that with the aid of the wire pin used as a means of direct traction on the fragments, in a manner similar to that described by Böhler in his recent book on the treatment of fractures, reduction can be carried out. We are able to overcome the great difficulty in handling these fractures, that is, overcome the existing deformities resulting from muscle pull, all of which can be carried out with the minimum amount of trauma. With the pin passing through the lower fragments, the action of the pronator teres to approximate the lower fragments is overcome and the normal interrosseus space is secured. The over-riding deformity, due to the longitudinal pull of the surrounding muscles, is easily overcome by straight traction. By merely rotating the hand, with the elbow flexed, any rotation deformity and anterior displacement of the upper fragment, due to the action of the biceps, can be easily corrected. With the fragments in place and the cast applied, incorporating the pin, we have the fragments fixed in such a way that there can be absolutely no displacement of fragments due to muscle pull. If we are dealing with a compound fracture, the reduction can be carried out with practically no further injury to the involved area. In treating such fractures, it is advisable to first do a complete debridement of the wound and then insert the pins. If there has been extensive laceration of the soft parts so that the skin edges cannot be approximated and further dressings are indicated, this can be carried out easily by merely cutting a window in the cast and in no way increase the possibility of losing our position. With this method we also overcome the possibility of an existing infection in the wound working its way down the muscle planes, which is apt to happen in treating these cases with overhead traction. During the period of convalescence the patient is extremely comfortable and can be easily followed in the out-patient clinic or any office, thus reducing the period of hospitalization.

In cases thus treated in the orthopedic service of Los Angeles General Hospital, where this work was carried out, at no time have we failed to get satisfactory reduction, and we have been able to maintain that reduction throughout the course of healing. In some instances the patient has been referred home after the third or fourth day following the reduction and treated thereafter in our out-patient clinic.

CONCLUSIONS

The use of the wire-pin traction is the most effective way of handling difficult fractures of the forearm because:

1. It gives us direct traction on the fragments;
2. It permits manipulation with a minimum amount of trauma;
3. It permits dressings in compound fractures without disturbing the fragments; and
4. It prevents malposition after reduction has been obtained.

1930 Wilshire Boulevard.

DISCUSSION

H. W. SPIERS, M. D. (614 Westlake Professional Building, Los Angeles).—Doctor Mathews has brought to our attention Böhler's ingenious and thoroughly sound method of handling difficult fractures of the forearm. It follows his cardinal principles in the reduction of fractures, *i. e.,* fractures should be reduced by traction and countertraction, the distal fragment should be placed in line with the proximal fragment, and immobilization should be complete until firm union has taken place. The major difficulty in the handling of fractures in this region has been in following out the first fundamental principle. The method presented maintains traction and countertraction readily, it automatically corrects alignment, and immobilizes by incorporating the skeletal traction in plaster.

The development of the piano-wire traction has made this form of skeletal traction in the smaller bones practicable. His spring steel traction collar is one of many developed recently, to produce the lateral tension necessary on the piano wire. It is efficient. I have used it with great satisfaction.

It is my opinion that those who will study and acquaint themselves with skeletal traction in the handling of the difficult fractures of the forearm will find a distinct and positive advantage in its use.

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ALFRED EDWARD GALLANT, M. D. (727 West Seventh Street, Los Angeles).—Doctor Mathews' paper is interesting from several standpoints because it offers a method of handling difficult fractures such as one encounters in the supracondylar region, either the comminuted or compound type in fractures of the acetabulum, where the head has been driven into the acetabulum, or such fractures where there is a distortion of part of the pelvic ring.

We have had a few cases of fractures of the ulna and radius which offered difficult reductions and were successfully treated by the application of piano-wire traction. We have had two fractures of the lower end of the humerus, one of which was compounded, and portions of the bone were lost at the time of the compounding. Such a fracture would offer a very difficult problem, from a conservative viewpoint, and it would be practically an impossibility to treat it without skeletal traction. However, with piano wire through the ulna, below the olecranon, and the incorporation of mechanical traction in a plaster spica, the result has been very gratifying, function having been returned to the elbow, although the original elbow joint had been badly damaged. The second case, a comminuted fracture of the humerus with considerable distortion of the fragments, in a woman about fifty-five years of age, was successfully and efficiently treated in the same manner, by piano-wire traction. We have found it very satisfactory to use piano wire with mechanical traction in fractures of the acetabulum, the mechanical traction being incorporated in the plaster spica, the piano wire and the spring loop being attached to the greater trochanter. The possibility of osteomyelitis with this method is greatly minimized as compared to the use of the Steinman nail, where there has been any extensive laceration and congestion of tissues which might lead to this unfortunate complication.

I quite agree with Doctor Mathews and his reference to Dr. Willis Campbell's remark that when conservative methods fail, skeletal traction of this type is of great value.

DOUGLAS D. TOFFELMIER, M. D. (367 Hawthorne Avenue, Oakland).—The treatment of forearm fractures with wires or heavier steel pins as a means of traction and fixation did not originate, unfortunately, in America. It has been used for several years in Europe by such men as Beck of Kiel, Böhler of Vienna, and Kirchner of Tubingen. The evolution of Böhler's method, as described in his present book, consisted of the following steps: First, manual traction of the forearm with countertraction above the elbow, flexed to 90 degrees, and the application of a nonpadded cast well moulded about the wrist and elbow to prevent shortening or rotation of the fragments. Second, the same type of traction for reduction with the insertion of a round wooden peg in the plaster on the volar and dorsal aspects of the forearm, which were pressed into the interosseus space to prevent the narrowing mentioned in this paper. This method was a great improvement over previous methods, but still did not answer in certain difficult fractures. Lastly, a manual reduction, and, while the traction was maintained, an insertion of two Beck wires (2 millimeters thick), and the application of the cast as described by Doctor Mathews. I use this last method of Böhler's frequently, and find it simple and very efficient. It differs from the method of Doctor Mathews only in that the reduction is made first, and the wires are inserted secondarily to act as two fixed points in the maintenance of the position of the bones. When Doctor Mathews is dealing with a forearm fracture in which the proximal or distal fragments have rotated on their longitudinal axes, the insertion of his wires before that deformity is corrected will prevent these fragments from returning to their original position. If Böhler's method of manual traction is followed closely, with the hand halfway between supination and pronation, and the elbow at a 90-degree angle, all the muscles involved will be on equal tension, and the fragments will almost always correct themselves sufficiently to insure an excellent functional result. If still more traction is necessary to overcome the shortening, the wires can be inserted and more traction can be applied by the use of Doctor Mathews' compressible U clamps only after the major deformities have been reduced.

I quite agree with Doctor Mathews that those methods of treating forearm fractures, described in American textbooks, are very frequently inadequate. I do not believe, however, that the major problem has been in the reduction, but rather in the maintenance of the reduction. Further I believe that the wires should not be inserted until the major deformities have been reduced. Wires inserted first and then used as a means of traction may become an obstacle in the reduction of the rotation and interosseus narrowing deformities.

CORNEAL ULCER—ITS TREATMENT*

By HAROLD F. WHALMAN, M. D.
Los Angeles

DISCUSSION *by William A. Boyce, M. D., Los Angeles; M. F. Weymann, M. D., Los Angeles; Roderic O'Connor, M. D., Oakland.*

A CONDITION which may cause a greater or lesser impairment of vision, unsightly scars upon a very conspicuous and expressive organ of the body and even entire destruction of that organ, is one which calls for the most expedient therapeutic measures at our command.

ETIOLOGIC FACTORS

Corneal ulcers in general are the result of the invasion of bacterial organisms into a vulnerable area in the cornea. Such an area may result from

* Read before the Eye, Ear, Nose and Throat Section of the California Medical Association at the sixty-first annual session, Pasadena, May 2–5, 1932.